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ABSTRACT

This paper looks at factors affecting the success of asynchronous online learning through an investigation of relationships between student perceptions and course design factors in the SUNY (State University of New York) Learning Network, one of the largest asynchronous learning networks in the country. It finds that three such factors--consistency in course design, interaction with course instructors, and active discussion--have been consistently shown to significantly influence the success of online courses. It is posited that the reason for these findings relates to the importance of building community in online courses. (Contains 17 references.) (MES)

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Course Design Factors Influencing the Success of Online Learning

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Abstract: *This paper looks at factors affecting the success of asynchronous online learning through an investigation of relationships between student perceptions and course design factors in one of the largest asynchronous learning networks in the country. It finds that three such factors -- consistency in course design, interaction with course instructors, and active discussion – have been consistently shown to significantly influence the success of online courses. It is posited that the reason for these findings relates to the importance of building community in online courses.*

Among the many and various possibilities occasioned by the growth of the World Wide Web (WWW), one of the most promising is distance education. In the rush to create online courses, however, the major focus has too often been on technological issues, whereas, as Mason (1994, p. 52) argues, "Social and pedagogical issues play by far the bigger part in the creation of a successful [online] learning environment."

In this paper, we document the efficacy of pedagogical approaches which foster online community. We first review the literature on the effects of course design features on student satisfaction and learning online. We then report our own findings on these topics from data collected during the Spring, 1999 semester from SUNY Learning Network (SLN) courses. Finally, we discuss these findings in the light of social constructivist theory.

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Background

All asynchronous online courses have important features in common. Kearsley (2000), for example, asserts that the virtual classroom is a "unique social context, much different from that of a regular classroom." On the other hand, online classes can be as various as face-to-face classes. Moreover, online, course interfaces are students' sole connection to instructors, peers, and the course materials, so their impact is magnified. Indeed, researchers have argued that the structure (Romiszowski & Cheng, 1992), transparency (Eastmond, 1995), and communication potential (Irani, 1998) of course interfaces heavily impact students' satisfaction, learning, and retention in online courses. Of particular importance, it seems, is the ability of the interface to facilitate interactions between students and teachers and among students.

The relationship between student-teacher interactions and learning outcomes has been well documented in traditional classrooms (Powers & Rossman, 1985). It stands to reason that interactions with instructors would be equally important online. Indeed, Picciano (1998) found that instructors' activity was related to students' perceived learning in online education courses. Richardson and Ting (1999) compared the perceptions of two groups of students involved in asynchronous learning. They found that students learning through written correspondence with instructors were more concerned with instructor feedback, whereas students learning online felt that all interactions with instructors, including instructor participation in class discussion, mattered. Jiang and Ting (1998) found correlations among students' perceived interactions with instructors and the average numbers of responses per student that instructors made and the average numbers of responses students themselves made in course discussions.

Indeed, course discussions seem to be one of the most influential features in online courses. Perhaps this is because online discussions are significantly different from face-to-face discussions. To begin with, all students have a voice and no students can dominate the conversation. The asynchronous nature of the discussion makes it impossible for even an instructor to control. Accordingly, many researchers note that students perceive online discussion as more equitable and more democratic than traditional classroom discussions (Harasim, 1990; Levin, Kim & Riel, 1990; Siegel, et al., 1998). In addition, because it is asynchronous, online discussion affords participants the opportunity to reflect on their classmates' contributions while creating their own, and on their own writing before posting it. This tends to create a certain mindfulness among students and a culture of reflection in the course.

However, as Eastmond (1995) reminds us, computer-mediated communication is not inherently interactive, but depends on the frequency, timeliness, and nature of the messages posted. Hawisher and Pemberton (1997) relate the success of the online courses they reviewed to the value instructors placed on discussion. Students in these courses were required to participate twice weekly and 15% of their grades were based on their contributions. Picciano (1998) found that students' perceived learning from online courses was related to the amount of discussion actually taking place in them. Likewise, Jiang and Ting (1998) report correlations between perceived learning and the percent of course grades based on discussion, and between perceived learning and the specificity of instructors' discussion instructions.

Such findings indicate that interaction among students is an important factor in the success of online courses. This could lead us to suspect that collaborative learning activities might also be supportive of success. However, researchers who have investigated collaborative learning online have found it remarkably unsuccessful (Hawisher & Pemberton, 1997; Siegel, et al., 1998; Sturgill, Martin & Gay, 1999). Whether collaborative learning itself does not mesh well with asynchronous formats or we have yet to discover effective ways to support collaboration online remains to be seen.

In summary, research to date indicates that the most successful online courses are well structured and easy to use, and take advantage of the increased access to instructors and more equitable and democratic discussion possible in online environments.

The SUNY Learning Network

The SUNY Learning Network is the infrastructure created to support asynchronous online courses for the sixty-four institutions and nearly 400,000 students of the State University of New York (SUNY) system. It's primary goals are to bring SUNY's diverse and high quality programs within the reach of learners everywhere, and to be the best

provider of asynchronous online instruction it can. With generous support from the Alfred P. Sloan Foundation, SUNY System Administration, and participating campuses, it has grown from offering eight courses to 119 students in the 1995-96 year to its current offering of more than 1,000 courses to over 11,000.

Methodology

In the spring of 1999, approximately 3,800 students were enrolled in 264 courses offered through SLN. At the end of the semester, students in all courses were asked to complete an online survey eliciting demographic information (8 questions) and students' perceptions about their satisfaction, learning, and activity in the courses they were taking (12 questions). Demographic questions concerned students' age, gender, academic level, employment, proximity to campus, prior computing and online experience, and their reasons for taking an online course. The more pertinent student perception data included their satisfaction with the courses, perceived learning from them, perceived interactions with instructors and peers, and personal activity in the courses. Fourteen hundred and six (1,406) students returned the survey. Survey data was analyzed using a series of one-way analyses of variance that looked for significant differences in student satisfaction and perceived learning relative to the other factors measured. The survey data was also averaged by course for use in correlations with course design data.

Because we were especially interested in actual course designs and the relationship between course design features and student perceptions, we looked at course variables in the 73 courses for which there was a 40% or greater rate of return on the student satisfaction survey. Two of the researchers separately examined each of the 73 courses and rated their content on 22 variables using Likert-type scaling. The variables examined can roughly be categorized as general course structure variables (course level, enrollment, the number of course modules and the consistency between them, the graphical quality of course pages, the number of links to external sources, textbook requirements, and instructor voice); interactivity variables (frequency and gaps in instructor interaction and feedback, frequency of interactions between students, required participation in discussion, authenticity of discussion questions, and the average length of discussion responses); and assessment variables (how often assignments were due and the percentage of the course grade that was based on papers, other written assignments, projects, quizzes and tests, discussion, and/or cooperative or group work). Ratings for each course were checked for agreement, and disagreements were resolved by consensus with reference to the courses themselves. Averages for student satisfaction, perceived learning, interaction with instructor, and interaction with peers were computed and added to individual course design records. Correlations were then run to look for relationships between course design variables and student perceptions. Because rankings along the various course design variables were not normally distributed, two-tailed Spearman's correlations were employed.

Results

All four student perception variables – student satisfaction, perceived learning, perceived interaction with the instructor, and perceived interaction with peers – were highly interrelated, but not identical.

Student satisfaction with the courses they were taking and their perceived learning from them were the most highly correlated variables we examined ($r = .784$, $p < .01$). The more students thought they learned from courses, the more satisfied they were with them. These two variables clearly did not measure the same perceptions, however, as shown in some of the correlations with course design variables that were significant for one but not for the other.

Correlational analyses also show that the more interaction students believed they had with their instructors, the more satisfied they were with their courses ($r = .761$, $p < .01$) and the more they thought they learned from them ($r = .707$). One-way analyses of variance also showed significant differences in student satisfaction ($F_{(3,1402)} = 188.97$, $p < .01$) and perceived learning ($F_{(3,1402)} = 168.25$, $p < .01$) among students interacting with their instructors at differing perceived levels. Students who reported low levels of interaction with their instructors also reported the lowest levels of satisfaction with their courses and the lowest levels of learning. Conversely, students who reported high levels of interaction with their instructors also reported higher levels of satisfaction with their courses and higher levels of learning from them. These findings highlight the critical importance of instructors' interactions with their students in online environments.

Similarly, the more interaction students believed they had with other students, the more satisfied they were with their courses ($r = .440$, $p < .01$), and the more they thought they learned ($r = .437$, $p < .01$). In addition, analyses of variance found significant differences in students' satisfaction with the courses they were taking ($F_{(3,1402)} = 68.91$, $p < .01$) and perceived learning from them ($F_{(3,1402)} = 50.27$, $p < .01$) for differing levels of perceived peer interaction. Students who rated their level of interaction with classmates as high also reported significantly higher levels of course satisfaction and significantly higher levels of learning. The findings point to the importance of creating interaction among classmates in online courses.

Perceived interaction with course instructors and perceived interaction with peers were also highly correlated ($r = .517$, $p < .01$). In addition, significant differences in student satisfaction ($F_{(3,1402)} = 44.21$, $p < .01$) and perceived learning ($F_{(3,1402)} = 90.20$, $p < .01$) were found among students reporting differing levels of activity in the online courses they were taking. Students who rated their level of activity as high also reported significantly higher levels of course satisfaction and significantly higher levels of perceived learning. These findings, once again, highlight the importance of creating opportunities for frequent and engaging student participation in online courses, especially participation interaction with each other and with their instructors. Taken all together, these results suggest that the development of online communities is a major contributor to the success of online courses.

The greater the percentage of the course grade that was based on discussion, the more satisfied the students were, the more they thought they learned from the course, and the more interaction they thought they had with the instructor and with their peers. The greater the percentage of the course grade that was based on cooperative or group work, the less students thought they learned from the course.

The correlation between the percentage of the course grade that was based on discussion and students' satisfaction with courses was significant ($r = .381$, $p < .05$). The correlation between the percentage of the course grade that was based on discussion and perceived learning approached significance ($r = .286$, $p < .10$). Thus, students were more satisfied with courses and believed they learned more when greater value was placed on discussion. Higher values put on discussion were also found related to greater perceptions of instructor ($r = .307$, $p < .05$) and peer interaction ($r = .455$, $p < .10$). Taken together, these findings point to the efficacy of discussion, and in particular to the value put on discussion, in online courses. The findings also suggest that shared discourse among students and instructors has a positive effect on student satisfaction with courses. They support previous findings linking the valuing of discussion to student satisfaction and learning (Hawisher & Pemberton, 1997; Jiang & Ting, 1998; Picciano, 1998), and further demonstrate the importance of discussion online.

Our results also show, however, that the greater the percentage of the grade that was based on cooperative or group work, the less students believed they learned from the course ($r = -.320$, $p < .05$). This finding replicates those of other researchers who have explored collaborative learning online (Hawisher & Pemberton, 1997; Siegel, et al., 1998; Sturgill, Martin & Gay, 1999). Student comments indicate that it was difficult to get group members to work together on projects in the few courses in which collaborative learning was tried. This may stem from embedded problems with asynchronicity. On the other hand, it may stem from instructor naivete concerning collaborative work. Future research clearly should explore this issue further and look for ways to successfully employ collaborative strategies online.

The greater the consistency among course modules, the more satisfied students were, the more they thought they learned, and the more interaction they thought they had with their instructors. The lower the number of modules in a course, the more students believed they learned from it.

Significant correlations were found between consistency among course modules and student satisfaction ($r = .333$, $p < .05$), perceived learning ($r = .474$, $p < .01$), and interaction with instructor ($r = .451$, $p < .01$). All of these correlations favored greater consistency. In addition, perceived learning was found to be related to the number of modules in a course ($r = .338$, $p < .01$). The fewer the number of modules a course had, the more likely students were to report higher levels of learning from it. The strength and persistence of these correlations demonstrate the superiority of straightforward course designs with relatively few, similarly structured modules. They support previous findings that link course structure to student satisfaction, learning, and retention ((Romiszowski & Cheng, 1992; Eastmond, 1995; Irani, 1998). Taken together, these findings highlight the fact that, lacking face-to-face communication, it is easy for students to get confused or lost in complex course structures.

Students' perceptions of interaction with their peers were related to actual interactions in courses, the percentage of the course grade that was based on discussion, required participation in discussions, and the average length of discussion responses.

A strong correlation was found between students' perceptions of their interactions with peers and the actual frequency of interactions between students ($r = .398$, $p < .01$). This finding demonstrates the accuracy of student perceptions. We also found correlations between students' perceived interaction with peers and the percentage of the course grade that was based on discussion ($r = .455$, $p < .01$), the required frequency of participation in discussion ($r = .369$, $p < .05$), and the average length of discussion responses ($r = .353$, $p < .01$). The results replicate previous findings (Hawisher & Pemberton, 1997; Jiang & Ting, 1998; Picciano, 1998). Taken together, they suggest that discussion fosters interactivity among students and that several factors contribute to successful online discussions. Some of these are the value instructors place on discussion, the frequency of participation in discussions they require, and the average length of students' discussion responses.

Students' perceptions of interaction with their instructors were related to the percentage of the course grade that was based on discussion and to the frequency of instructor feedback.

As previously noted, a correlation was found between students' perceived interaction with the instructor and the percentage of the course grade that was based on discussion ($r = .307$, $p < .05$). Students' perceived interaction with their instructor and the actual frequency of instructor feedback approached significance ($r = .269$, $p < .10$). These findings, while weaker than findings concerned with peer interactions, once again demonstrate the accuracy of student perceptions, and highlight the importance of instructors' activity in online courses (Jiang & Ting, 1998).

Discussion

The findings of the research on computer-mediated communication and asynchronous online learning are quite consistent. They point to three (and only three) course design factors that contribute significantly to the success of online courses. These are a transparent interface, an instructor who interacts frequently and constructively with students, and a valued and dynamic discussion. This study, which looks at such factors across 73 courses with a similar high level interface, both corroborates and elaborates these results.

It is our belief that this combination of factors is not an accident, but rather that they jointly support the growth of what Scardmalia & Bereiter (1996) call "knowledge building communities." We agree with many in the online education field that the development of such communities is critical to the success of online courses (Harasim, 1990; Wegerif, 1990). Wegerif, for example, relates the success or failure of individuals enrolled in Open University courses to the extent to which they could "cross the threshold" from feeling like outsiders to becoming a part of the online community. Similarly, Romiszowski & Corso (1990) suggest that computer-mediated communication is essentially social constructivist in nature. According to Kearsley (2000), it may be uniquely so.

The identification through empirical research of these three factors – consistency in course design, contact with course instructors, and real communication through discussion – is both supported by social constructivist theory and supports social constructivist notions of the importance of the development of knowledge building communities. It also can guide the development of asynchronous online courses. It very well may be that other theoretical approaches can be successfully instantiated online. At present, however, the efficacy of social constructivist designs has been quite clearly demonstrated and surely deserves further, in depth, investigation.

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